Submission of the
Asiana Pilot Union
to the
National Transportation Safety Board
Regarding the Accident Involving

Asiana Flight 214
B777-200ER
DCA13MA120
San Francisco, CA
July 6, 2013

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Acronyms/ Definitions

AFDS	Autopilot Flight Director System
APU	Asiana Pilot Union
FLCH	Flight Level Change
FPM	Feet Per Minute
IP	Instructor Pilot
Kts	knots (nautical mile per hour)
MSL	Mean Sea Level
NM	Nautical Mile
NORCAL	Northern California Terminal Radar Approach Control
OE	Operating Experience
PDT	Pacific Daylight Time
PF	Pilot Flying
PM	Pilot Monitoring
SFO	San Francisco International Airport
VOR	VHF Omnidirectional Range Navigational Aid
VS	Vertical Speed

Executive Summary

On July 6, 2013, at 11:28 PDT, Asiana flight 214, a Boeing 777, operated by Asiana Airlines struck a seawall short of runway 28L at San Francisco International Airport (SFO). The airplane was destroyed by impact forces and fire. Three of the 291 passengers were fatally injured.

As in any accident there are a number of factors that led to the accident involving Asiana flight 214. Although the Board will issue a probable cause in this investigation, the truth is that this was a multi-faceted accident and is not as singular in dimension as a probable cause would lead one to belief.

Although the Asiana Pilot Union (APU) was not a party to the investigation, nor an advisor to the Korean Aviation and Railway Accident Investigation Board (ARAIB), APU was able to participate in the investigative hearing. APU believes that additional involvement of APU in the field phase of the investigation would have assisted both the NTSB and KARAIB in gathering factual information related to this investigation.

This submission will focus on several deficiencies identified during the course of the investigation. Each one of these deficiencies, if identified prior to the accident would have resulted in the prevention of this accident.

1.0 Factual Information

1.1 History of Flight

Asiana flight 214 departed the gate at Incheon (ICN) at 00:30 PDT and took off at 00:53 PDT. The flight crew was comprised on 4 pilots, with the primary flight crew being a trainee Captain and an Instructor Pilot. There were 12 flight attendants and 291 passengers. Flight 214 was the first flight of a scheduled two day trip, with a scheduled layover in SFO. The flight had an estimated time enroute of 10 hours and 24 minutes.

Since this was a training flight for the trainee captain, he occupied the left seat for takeoff and landing and was the Pilot Flying (PF), while the Instructor Pilot (IP) occupied the right seat and was the Pilot Monitoring (PM). The primary flight crew operated the flight for the first 4 hours and 15 minutes and then was relieved by the relief captain and first officer for the next 5 hours and 15 minutes of the flight. The primary flight crew returned to the flight deck to operate the aircraft for the remainder of the flight, including the descent, approach, and landing.

The crew flew the Golden Gate 6 arrival into SFO and was instructed to depart the SFO VOR on a heading of 140°. After the flight crossed over the SFO VOR, NORCAL instructed the flight to slow to 210 kts and descend and maintain 9,000’ MSL. The flight was subsequently cleared to descend and maintain 6000’ MSL. Following additional vectors and descents, the flight was asked if they had SFO in sight and the crew responded that they did have the field. NORCAL cleared flight 214 for a visual approach to runway 28L and to fly heading 310 to intercept the final approach. Fourteen nautical miles from SFO the crew was instructed to maintain 180 kts until a 5nm final.

During the approach the trainee captain utilized the AFDS vertical speed (VS) mode to descend the aircraft. The crew observed that the aircraft would be high crossing DUYET so the trainee captain increased the rate of descent from 1,000 feet per minute (fpm) to 1,500 fpm. The trainee captain requested flaps be set to 20° and the command altitude be set to the missed approach altitude of 3,000’ MSL. Subsequently the trainee captain asked for the flaps to be set at 30° and after slowing to the maximum speed for flap 30° extension the flaps were extended.

At approximately 1,600’ MSL the AFDS mode changed to FLCH SPD due to this change in mode and the command altitude set at 3,000’ MSL the throttles began to increase power and the aircraft began to pitch up. Immediately following this increase in pitch and throttle, the autopilot was disconnected and the thrust levers were moved to the IDLE position. The autothrottles went into HOLD mode shortly after the reduction in the thrust levers. The PM set the command speed of 137 kts and turned the flight director (FD) off. At 500’ radio altimeter

(RA) the aircraft was slightly low. From 500’ RA to 200’ RA the airspeed decreased from 135 kts to 118 kts.

Just prior to impact with the seawall, the PM pushed the thrust levers forward and called ‘go around.’ The aircraft was pitched up to 10°, but continued to sink. The stick shaker activated and 2-3 seconds later the aircraft’s aft fuselage struck the seawall.

2.0 Analysis

2.1 Pilot Training

The Asiana Training Program for the Boeing 777 was developed by Boeing for its customers. The training program involves three basic elements: a ground portion, a simulator portion, and an operating experience portion. While the training program is good overall this accident identified some deficiencies.

One deficiency was the lack of information and training on the use of the Flight Level Change (FLCH) mode, as well as the interface of that mode with the autothrottle system. Pilots were not specifically trained that the autothrottles in the HOLD mode would not engage in the event the aircraft became slow. In fact in the Investigative Hearing when asked the Asiana Manager of Flight Crew Training if there was any place other than a note in the FCOM that described that the autothrottle would not advance in HOLD, he answered no. Pilots should be provided the system knowledge to ensure that they can safely operate an aircraft, in this case a key piece of information was not provided as part of the normal training program at Asiana.

As demonstrated in the Simulator Observational Study (Human Performance Attachment 2), ensuring a stabilized approach when starting an approach high is extremely difficult and in the study the pilots were even given practice runs. There needs to be additional guidance provided to both air traffic controllers and pilots on the importance of ensuring that an aircraft is on the correct altitude profile for an approach. Additionally the study demonstrated that even experienced and highly trained test pilots on the accident scenario had difficulties flying the approach. This information is invaluable to crews and should be provided in training that although you may not be at 500’ on a visual approach or at 1000’ on an instrument approach, if you are high and/ or fast and having difficulties getting on profile that a missed approach may be executed sooner than the minimum stabilized approach altitude.

2.2 Operating Experience (OE)

As part of the normal training program, a new pilot to an aircraft will complete OE following successful completion of all the required training elements. In the case of Asiana, the trainee captain was required to accomplish 60 hours of OE with an IP. Operating Experience is used to ensure that the trainee becomes familiar with line operations in a particular aircraft type and is ready to ‘fly the line’. In the case of Asiana flight 214, the IP assigned to the flight was flying his very first leg as an IP on OE.

2.3 Go-Around Decision

There is no doubt that this flight should have executed a go-around at a point much earlier in the approach. According to the Asiana manuals the flight needed to be stabilized by 500’ AGL

since it was a visual approach. At 500' on this approach the aircraft complied with all the elements of the stabilized approach criteria *sans* one, the vertical speed was in excess of 1000 fpm.

The challenge is when and who should have commanded the go around. According to the PF, he felt that only the IP could command the go around. In addition, the Asiana Pilot Operating Manual (POM) stated that the decision to make a missed approach rests with the Captain[1]. In a review of the cockpit voice recording (CVR) transcript and the interview summaries, it appears as though the crew did work well together.

[1] Asiana B777 POM 2. Supplementary NP 2.19.1.1

2.4 Air Traffic Control

2.4.1 Displaced Threshold

SFO has been undergoing construction on its runways from July 2012. Latest development as a result of construction work is that the LDA (landing distance available) had changed and a displaced threshold of 300 feet had been put in place. This new information was not adequately disseminated to pilots in the Jeppesen Chart in a timely manner. Was a revised AIP issued on this change. (See Figure1)

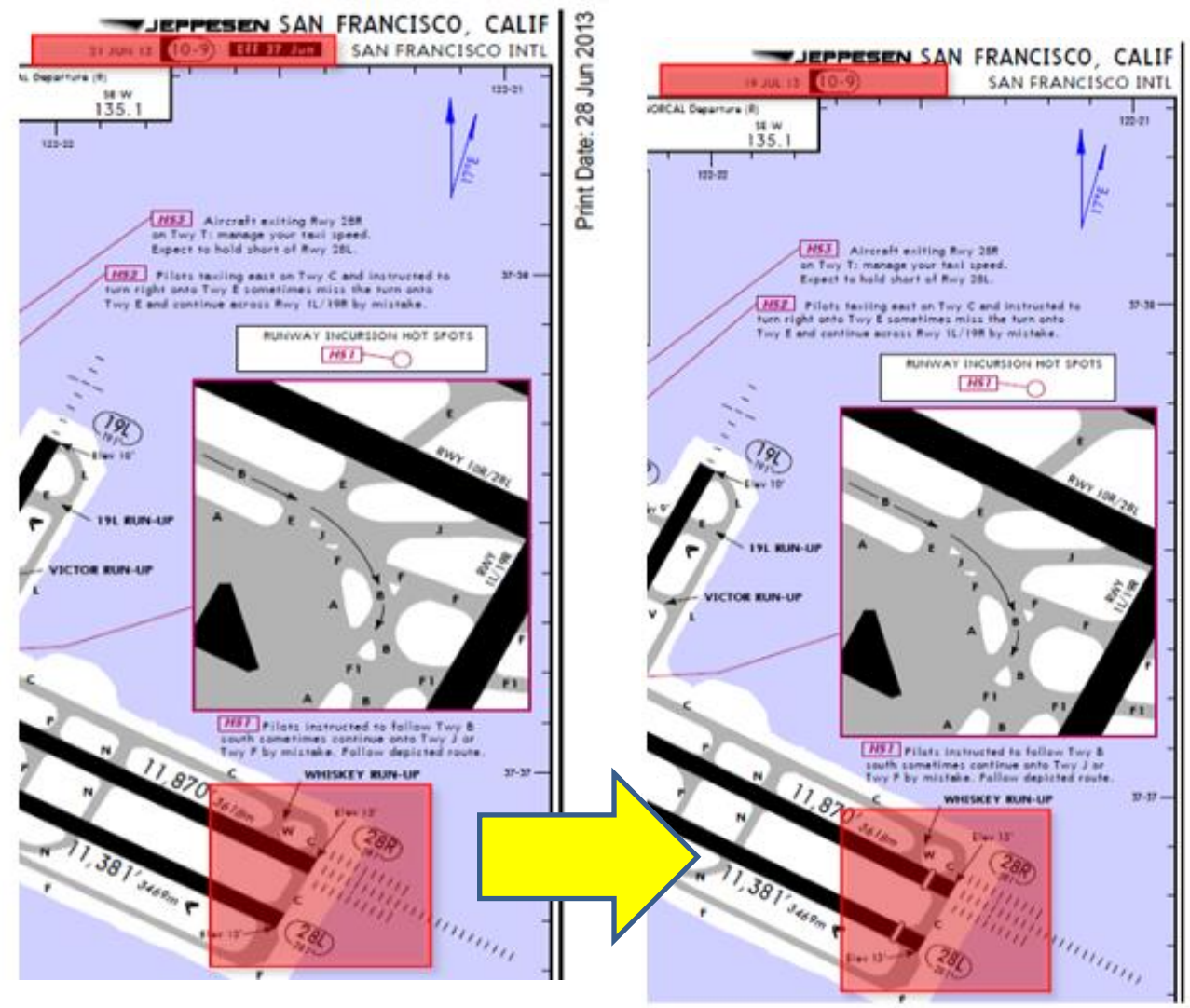

Figure 1 - Jeppesen Chart

2.4.2 Risk Mitigation by the Use of Instrument Approach

Prior to the accident, RNAV (GPS) approaches, LOC/DME approaches and visual approaches were available at SFO, and the visual approach was used to facilitate the traffic flow at SFO. When a precision approach is not available, a non-precision approach procedure is preferable to a visual procedure. To mitigate any fatigue and jet lag resulting from long haul flights and time zone differences, the FSF (Flight Safety Foundation) study recommends instrument approach to visual approach. (See Figures 2-4)

> In 75 % of the ALA accidents, a precision approach aid was not available or not used
>
> The accident risk is 5 times greater for commercial aircraft flying a non- precision approach compared with those flying a precision approach
>
> *FSF ALAR Report*

Figure 2 - FSF Approach and Landing Accident Report

Figure 3 - FSF Approach and Landing Accident Reduction (Title Slide)

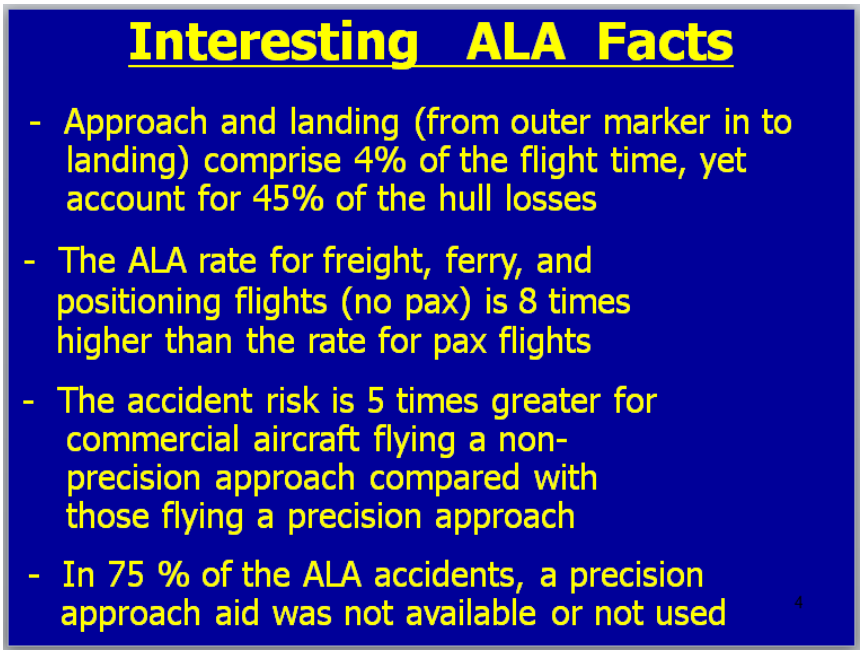

Figure 4 - FSF Approach and Landing Accident Reduction (Informational Slide)

2.4.3 Asiana Pilots' Comments on ATC Instruction

The usual ATC pattern of NorCal TRACON is to clear the aircraft for a visual approach and to maintain 180 kts until 5NM to SFO ("*Cleared for visual approach runway 28L, maintain 180kts until 5nm." AM 1122 LOCAL Time excerpted from NTSB ATC Group Chairman's Field Notes Figure 6*). The subsequent simulator testing has shown that maintaining 180 kts to 5 nm makes it difficult to complete the landing configuration and checklist before passing through 1000 feet for checklist completion. (See Figure 5)

Figure 5 - The following picture was taken during a simulator testing, showing the landing configuration (flap 30) and approach target speed (137 KT) completion around 680 feet while complying with the ATC instruction (180 KT, 5 NM)

There was an altitude loss of 1,000' during 56 seconds between the initial and second tower contacts at the time of the accident. The SFO tower's lack of response to the attempted contacts significantly increased the workload for pilots who had to solely relying on visual cues during visual approach.

2.4.4 Asiana Pilot's Comments on Late Landing Clearance

After two attempts to contact the control tower at SFO, landing clearance was given at 600 feet. Such a late landing clearance at 500 feet, ATC read backs, and carrying out the landing checklist would be considered a pilot distraction threat. Since Boeing Flight Crew Training Manual adopts Flight Safety Foundation's stabilized approach criterion which is 500' in VMC, issuing landing clearance at 600 feet was pushing it to the marginal altitude. (See Figure 6)

11:26:00 2,000' Asiana 214 first attempt to contact control tower
11:26:56 1,000' Asiana 214 second attempt to contact control tower
11:27:10 600' Control tower clears Asiana 214 to land

Figure 6 - NTSB ATC Field Notes Page 7 Figure 4

Various components of the flight, such as visual approach and late landing clearance, were likely to have increased the workload and divided the concentration of the pilot. This circumstantial factor – where the pilot was unable to give his undivided attention to monitor speed and other flight instruments – may have contributed to the unfortunate accident.

3.0 Recommendations

As a result of this investigation, the Asiana Pilot Union suggests that the NTSB make the following recommendations.

1. To Boeing, amend the B777 training program to include more training on the autothrottle modes and logic.
2. To Boeing, amend the B777 Aircraft Flight Manual to include more description of the autothrottle logic with respect to the HOLD mode.
3. To Asiana, amend the B777 training program to include more training on the autothrottle modes and logic.
4. To Asiana, incorporate into the Asiana training program more information and training for the pilot monitoring.